IDAHO DEPARTMENT OF LANDS

Continuous Forest Inventory Report

Southwestern Idaho Supervisory Areas

2002 Remeasurement

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SOUTHWESTERN IDAHO SUPERVISORY AREAS

2002 Remeasurement

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ACKNOWLEDGMENT

This project could not have been completed without the willing assistance, cooperation, and contributions of the Southwestern Idaho Supervisory Area staff.

SUMMARY

The Idaho Department of Land's Southwestern Idaho Supervisory Areas includes 58,616 acres of primary forest land, 13,110 acres of secondary forest land, and 429,436 acres of non-forest land. Primary forest land classified as sawtimber comprises 51,041 acres. The remaining 7,575 acres of primary forest land are in various stages of regeneration.

This report has been prepared from continuous forest inventory (CFI) data (permanent and temporary plot measurements) collected during the summer of 2002. These measurements were compared with previous measurements to estimate net volume change. This net volume change was expanded to establish trends and annual harvest alternatives.

The State Board of Land Commissioners uses this report as a tool to help select an annual allowable harvest level designed to satisfy the state's management objectives. The selected annual harvest level will ensure that the state's management objectives are achievable in light of current stand conditions and stand structure, current resources, and environmental and social concerns.

INTRODUCTION

Objectives

This report is designed to help Idaho Department of Lands personnel develop policies to fulfill the department's endowment land management objective: Maximizing long-term revenue to the beneficiary institutions while maintaining the capability of the forest to ensure a perpetual flow of forest products. Data collected from continuous forest inventory (CFI) plots was used to:

- Determine current stand conditions;
- Compute net volume change; and,
- Analyze the impacts of harvest alternatives.

Abbreviations, definitions, and timber type descriptions used throughout this report can be found in the appendices.

Geographic Area

The Southwestern Idaho Supervisory Areas are located in Ada, Boise, Canyon, Elmore, Gem, Owyhee, Payette, Valley, and Washington counties (Figure 1). The Area is bounded on the west by the State of Oregon, the south by the State of Nevada, the east by the Southcentral Supervisory Area, and the north by the Payette Lakes Supervisory Area.

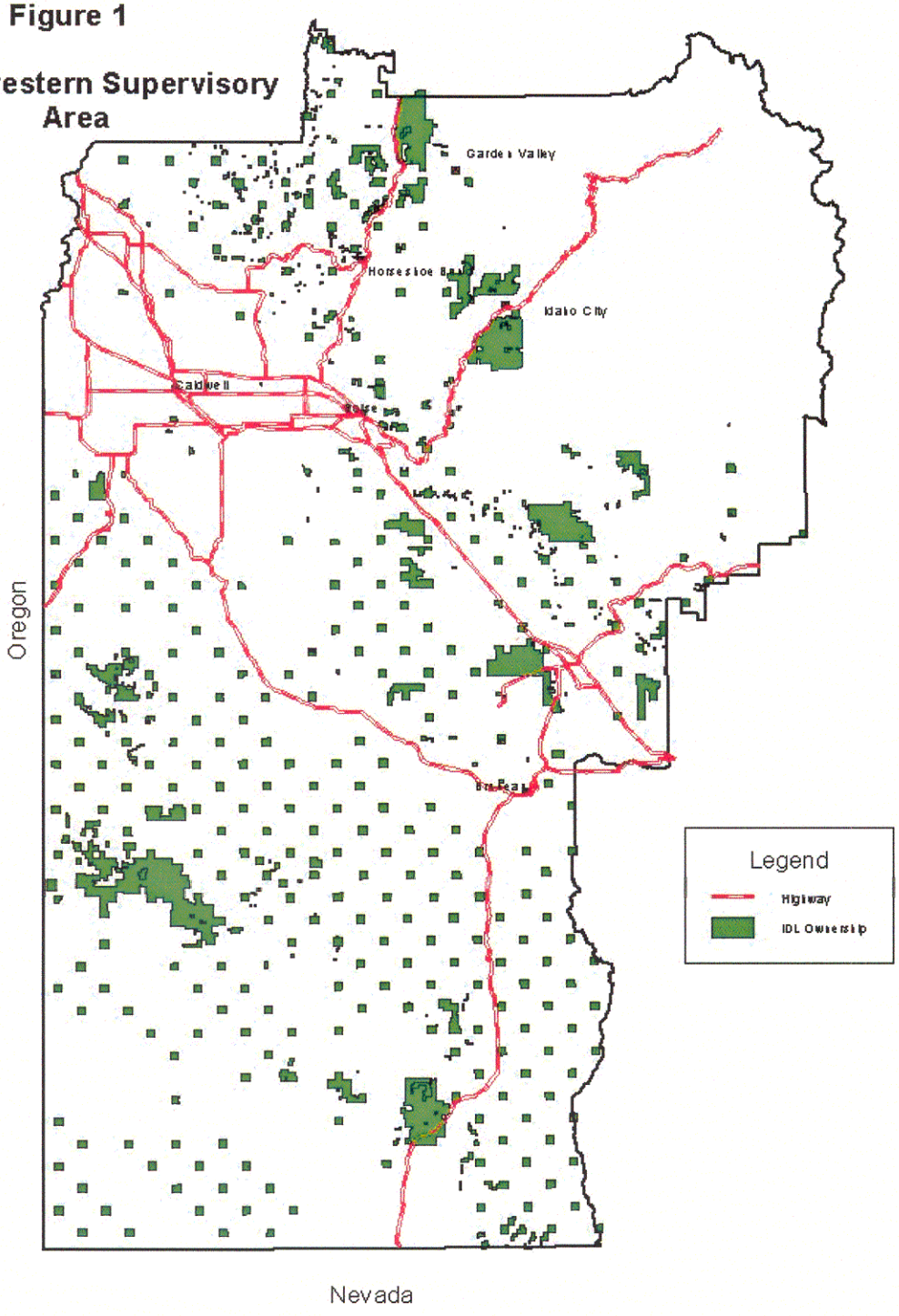
Historical Perspective

In 1890, the President of the United States signed the Idaho Admission Bill declaring the formal existence of the State of Idaho. The Admission Bill granted the new state selected lands including the equivalent of two of every 36 square miles of federally owned land in Idaho. These lands were acquired under a trust agreement whereby proceeds from these lands would exclusively benefit certain designated public institutions, primarily public schools. This trust agreement as defined in federal statutory laws and the state constitution stipulates that Idaho's state lands be managed "… **in such manner as will secure the maximum long term financial return to the institution to which granted**..." This mandate is more specific than the federal policy of managing federal lands for attainment of maximum benefits for the public.

Prior to the 1974 remeasurement, Southwestern Idaho and Payette Lakes Supervisory Areas were combined as one supervisory area.

Figure 1

Southwestern Supervisory Area



The Southwestern Idaho Supervisory Area inventory plots were initially established and measured in 1968. Subsequent remeasurements were completed in 1974, 1986, and 1996.

The Boise Basin and South Fork Boise River unit of the Southwestern Idaho Supervisory Area is dominated by Douglas-fir and ponderosa pine. The Packer John unit is more of a coniferous mix containing almost all of the lodgepole pine, grand fir, Engelmann spruce, and subalpine fir volume.

Soils are mainly sandy to loamy soils over moderately to well decomposed granitic bedrock with masked fracturing. Landform types are maturely dissected mountain slopes with rounded ridgetops.

2002 Remeasurement Procedures

The CFI plots were measured during the summer of 2002 using procedures outlined in the 2001 "Forest Inventory Field Procedures, Specification, and Definitions" manual.

Timber typed (Appendix C and D) and land management bases (Appendix E) were assigned to all endowment lands on the area. These types were field verified during the summer of 2002. The annual harvest alternatives were analyzed using the primary base only. The secondary forest land is not included in the harvest analysis, however, harvest operations may occur in these areas.

The Department of Lands CFI precision goal is ±10 percent at the 95 percent confidence level for all sawtimber types combined. In addition, each sawtimber type had a minimum of 30 subplots. To meet this goal, 136 randomly distributed plots were measured (97 previously established permanent plots and 39 new temporary plots). The maximum acreage represented by any subplot was 300 acres.

The standard error for all timber types combined is statistically sound at 8.3 percent at the 95 percent confidence level (Table 1).

Table 1. Data Reliability by Timber Type
Southwestern Idaho Supervisory Area

Primary Timber Type	Number of Subplots	Mean	Coefficient of Variation	Percent Standard Error
11	65	6,342	0.88	21.5
12	44	13,776	0.76	22.4
13	50	23,417	0.79	22.0
21	63	3,906	0.95	23.6
22	77	8,679	0.66	14.7
23	66	13,197	0.71	17.1
All Plots[1]	365	9,066		8.3

1 Percent standard error for all sawtimber plots (timber types 11– 23) is based on a combined volume and SE by timber type, which is an accepted method of calculating forest inventory data.[2]

The overall sampling error in % is smaller than any of the individual timber type strata. This is normal. The reason is that the sum is adding up directly, but the sampling errors are compensating for each other and adding up more slowly. The larger the sample size, the lower the percent standard error.

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2. Western Forestry and Conservation Association. 2000. Using Applied Growth and Yield Tools for Forest Land Planning and Inventory. Page 9.

LAND BASE

The Southwestern Idaho Supervisory Area encompasses a total of 501,162 acres of endowment trust land. Lands classified as primary forest comprise 58,616 acres (Table 2). Although the definitions are not synonymous, primary forest land base, as defined in this report, can be equated for comparison purposes to the commercial forest base lands described in previous inventory reports. The total primary base acreage has decreased by 375 acres from the commercial base identified in the 1996 measurement, due to reclassification of the primary base. See Appendix F for acreages for the Southwestern Idaho Supervisory Areas.

Table 2. Primary Acres by Timber Type
Southwestern Idaho Supervisory Area

Primary Timber Type	Acres	%
11	4,840	8.3%
12	5,772	9.8%
13	3,588	6.1%
21	15,337	26.2%
22	16,646	28.4%
23	4,858	8.3%
Total Sawtimber	51,041	87.1%
31	332	0.6%
32	1,818	3.1%
33	258	0.4%
41	343	0.6%
42	820	1.4%
43	836	1.4%
50	1,643	2.8%
60	1,525	2.6%
Total Non-Sawtimber	7,575	12.9%
Total Primary Base	58,616	100.0%

VOLUME

The Area's total net standing sawtimber volume, calculated from the net volume per acre average by timber type, is 465,251 MBF (Table 3). The total net standing volume for only the sawtimber types is 462,707 MBF.

Table 3. Primary Forest Timber Type Volumes
Southwestern Idaho Supervisory Area

Primary Timber Type	Net Cubic Volume Per Acre	Gross Volume Per Acre (BD FT)	Net Volume Per Acre (BD FT)	Total Net Volume (MBF)
11	1,176	7,008	6,342	30,696
12	2,501	15,528	13,776	79,511
13	4,267	25,621	23,417	84,019
21	867	4,148	3,906	59,906
22	1,878	9,286	8,679	144,465
23	2,772	14,711	13,197	64,110
Total Sawtimber	1,831	9,897	9,066	462,707
31	151	716	716	238
32	198	412	400	728
33	-	-	-	-
41	-	-	-	-
42	-	-	-	-
43	-	-	-	-
50	58	249	228	375
60	148	1,161	789	1,203
Total non-sawtimber	96	418	336	2,544
Total Primary Base	1,607	8,672	7,937	465,251

This total is 22 MMBF higher than the 1996 measurement.

Douglas-fir, and ponderosa pine comprise 81% of the Area's sawtimber types total net volume (Table 4). Approximately 58% of the net sawtimber volume is in the small sawtimber types (timber types 21, 22, & 23). Net volume by diameter class is listed in Table 5. Approximately, 41% of the net sawtimber volume is in diameter classes 20

inches and larger.

Table 4. Net Sawtimber Volume by Species (MBF)
Southwestern Idaho Supervisory Area

Species	Large Sawtimber (Types 11, 12, & 13) Volume	%	Small Sawtimber (Types 21, 22, & 23) Volume	%	Total Volume	%
Douglas-Fir	47,975	25	75,314	28	123,289	27
Ponderosa Pine	79,196	41	170,193	63	249,389	54
Western White Pine	-	-	-	-	-	-
Lodgepole Pine	1,479	1	8,930	3	10,409	2
Grand Fir	51,988	26	9,423	4	61,411	13
Subalpine Fir	6,458	3	2,589	1	9,047	2
Engelmann Spruce	7,130	4	2,032	1	9,162	2
Western Hemlock	-	-	-	-	-	-
Western Redcedar	-	-	-	-	-	-
Western Larch	-	-	-	-	-	-
Total	194,226	100.0	268,481	100.0	462,707	100.0

Table 5. Net Volume by Diameter Class (MBF)
Southwestern Idaho Supervisory Area

Diameter	Volume	%
8.0-9.9	8,216	1.8
10.0-11.9	23,637	5.1
12.0-13.9	47,172	10.2
14.0-15.9	42,100	9.1
16.0-17.9	50,328	10.9
18.0-19.9	60,046	13.0
20.0-21.9	53,961	11.7
22.0-23.9	31,842	6.9
24.0-25.9	42,144	9.1
26.0-27.9	22,062	4.7
28.0-31.9	27,558	5.9
32.0-35.9	26,037	5.6
36+	27,604	6.0
Total	462,707	100.0

NET VOLUME CHANGE

The net volume change analysis was performed for each timber type at the subplot level by comparing the current data for individual subplots with data from previous measurements. Net volume change is calculated by subtracting the subplots initial net volume from the final net volume and adding in any volume harvested. Subplot level changes were used to calculate the annual weighted net change per acre for each sawtimber type. These were then accumulated to provide a weighted average annual net volume change per sawtimbered acre (Table 6).

The Area's total annual net volume change provides a benchmark in determining the annual harvest level. Overall, the over-mature, large sawtimber stands have a higher per acre net annual change than the small sawtimber stands. This is due to the large sawtimber, low stocked, seed tree stands, timber type 11, having double the growth rates of the second growth, low stocked, seed tree stands, timber type 21. Almost all of the CFI plots in timber type 11 have been logged since the last inventory, and their annual net volume change is influence by the harvested volume. CFI plots in timber type 21 were logged prior to the last inventory and exhibit the lower growth rates associated with seed tree stands. Over-mature, medium and highly stocked sawtimber stands do not have the higher net growth rates that the younger second growth stands exhibit (Appendix F). The Southwestern Idaho Supervisory Area has approximately 84 percent of their sawtimber acreage under management. The current calculation of annual net volume change may closely represent the Area's potential growth.

We believe the term "annual net volume change" is preferable to "growth" because it is based on actual plot to plot analysis of data. "Annual net volume change" in Table 6, is based on plot measurements that go back to the 1968 inventory. This provides a long term measurement window to average out the fluctuations caused by weather, insects, disease, and plot measurement differences. Also some plot measurement differences are attributed to change in basal area factor from the original inventory to the current and using different contractors for each inventory. "Annual net volume change" for sawtimber types, averaged 188 board feet per acre. The total "annual net volume change" on the Southwestern Idaho Supervisory Area, for all types, is 9.8 MMBF or 166 board feet per acre.

Table 6. Annual Net Volume Change Per Acre
Southwestern Idaho Supervisory Area

Timber Type	Net Volume Change (BD FT)	Acres by Timber Type	Total (MMBF)
Large Sawtimber (Timber Types 11 - 13)	215	14,200	3.0
Small Sawtimber (Timber Types 21 - 23)	177	36,841	6.5
Average Sawtimber (Timber Types 11 - 23)	188	51,041	9.6
Pole Size Sawtimber (Timber Types 31 - 33)	4	2,408	0.0
Sapling-Seedling Size (Timber Types 41 - 50)	33	5,167	0.2
All Timber Types	166	58,616	9.8

Using the same procedure and calculating "annual net volume change" since the 1996 inventory, the total "annual net volume change" on the Area for the last six years is 9.86 MMBF or 168 board feet per acre. The "annual net volume change" since the 1986 inventory is 9.92 MMBF, or 169 board feet per acre.

HARVEST ALTERNATIVES

Annual harvest levels were derived using an IDL Planning Tool software package developed for the Idaho Department of Lands by Mason Bruce and Girard, Inc. (MB&G). This set of integrated software tools incorporated the agency's trust objectives of maintaining and improving the productive capacity of forest lands and maximizing long-term financial return.

The Department objectives for State endowment forest lands are to:

1. Manage forest resources to secure the maximum long-term financial return to the endowment trust institutions.

2. Provide the highest "long-term" sustainable harvest level while minimizing flow fluctuations; and,

3. Maintain and improve the capability of forestlands to produce marketable forest products in perpetuity while protecting water quality and beneficial uses.

The following broad management strategies will generally be followed in the process of pursuing these objectives:

1. Convert mature primary management base sawtimber stands into younger, faster growing stands;

2. Establish an even-age class distribution;

3. Ensure a perpetual flow of forest products; and,

4. Reduce growing stock levels in heavily stocked stands (timber types 43, 33, 23, and 13).

IDL Manager and Yield Table Tools

The IDL Manager software tool stratifies the CFI plot data into analysis units (timber types) and three site index classes (high, medium and low) for each analysis unit and also compiles the net volume for each analysis units. The Yield Table tool then derives yield tables for each analysis unit by site class based on the plot data and the associated harvest regimes.

Regeneration yield tables for determining yields for future natural and planted stands,

were also derived for each of the three site classes (Appendix F). These yield tables were used to determine the Area's Mean Annual Increment (MAI) and Periodic Annual Increment (PAI) by site class (Appendix F). The intersection of the MAI and PAI curve is considered the optimum biological harvest age in terms of maximizing net annual board foot production.

Desired Standing Volume

To maximize productivity and financial returns a desired standing volume (DSV) was calculated based on the assumptions that:

- There is a desired standing volume which, when equally distributed by acres over age classes, will achieve management objectives;

- The maximum age, and thus the rotation age for naturally regenerated stands, is the culmination of the MAI;

- The maximum age, and thus the rotation age for planted stands, is the age of maximum Present Net Value (PNV).

- A financial analysis on the cost and return for doing precommercial thins, showed a higher PNV, for precommercially thinned stands versus not doing precommercial thins. Because of the drier sites in southwestern Idaho, high and medium sites were commercially thinned once before final harvest. Current management practices, on the drier sites, include one and sometimes two commercial thins before final harvest. At a discount rate of 4%, the high sites showed a positive return and the medium and low sites showed a negative return. For medium sites that were precommercially thinned, a positive return was obtained using a discount rate of 3.8% and the stands that were not thinned showed a positive return using a discount rate of 3.2%. Medium sites that were also commercially thinned showed a positive return using a discount rate of 3.9%. For the low sites, the precommercially thinned stands showed a positive return using a discount rate of 2%. The low site stands without a precommercial thin showed a positive return using a discount rate of 1.4%. Because of the nature of the low sites in the Southwestern Idaho Supervisory Area, only 50% of the low sites were precommercially thinned.

Two levels of desired standing volume were computed:

1. All high and medium sites were regenerated naturally, precommercially thinned, and commercially thinned once and grown to their culmination point, while only half of the low sites were precommercially thinned (Nat-DSV).

2. All planted stands, approximately 30 acres per year, were precommercially thinned and grown to their maximum PNV. The high and medium natural stands were regenerated naturally, precommercially thinned, and commercially thinned once, and half of the low site stands which were precommercially thinned (Econ-DSV). Since the Southwestern Idaho Supervisory Area plants only 30 acres per year and the IDL Planner calculated that only 604 acres were in the high sites, only medium sites were planted. Since riparian zones normally are better sites, these riparian zones contain some of the high site acres. For these reasons, only medium sites were made available for planting for calculating the economic desired standing volume.

Using the first method the desired standing volume levels for the Southwestern Idaho Supervisory Areas, if all stands are regenerated naturally (Nat-DSV), is 402 MMBF (Table 7). The desired standing volume, where a portion of the medium sites are planted and the other sites regenerated naturally (Econ-DSV), is 397 MMBF

Table 7. Desired Standing Volume
Southwestern Idaho Supervisory Area

Nat-DSV

Site Class	Total Volume (MMBF)
High	10
Medium	197
Low	196
Desired Standing Volume	402

Econ-DSV

Site Class	Total Volume (MMBF)
High	10
Medium	191
Low	196
Desired Standing Volume	397

Once the desired standing volume is established, alternative harvest levels and

schedules can be determined. The harvest scheduling goal is to achieve a regulated forest and reduce the current standing volume to the desired standing volume. Stands were grown using the Windows version of the USFS's Spectrum (Version 2.01) harvest scheduling model, otherwise known as SpecWin.

Harvest Regimes

Spectrum is a linear programming model that optimizes an objective function to a set of constraints. The IDL's objective is to maximize the Present Net Value (PNV). For each harvest level, the model was run to optimize for maximum PNV.

Harvest regimes were developed for each analysis unit. Actual management activity is based on site specific conditions and may be different from the analysis regimes.

- Stumpage value was based on the Area's average stumpage value, by species, over the last ten years.

- Stands were commercially thinned based on stand site index class and age with a minimum removal of 3,000 board feet per acre.

- Final harvest regimes include shelterwood harvest for naturally regenerated stands (60 percent volume removal) and clearcut harvest (100 percent volume removal) for planted stands.

HARVEST ANALYSIS RESULTS

Various harvest levels designed to adjust the current standing volume toward the desired standing volume over time were analyzed. The analyses held harvest levels fixed throughout the analysis period with the exception of the optimize PNV harvest level run.

Annual harvest levels were calculated for a one hundred year period to show sustainability. However, it is difficult to make accurate predictions one hundred years into the future. Basing predictions on information derived from both actual CFI measurements and harvest scheduling software improves those predictions. However, market conditions, natural events, and changing social and political values still restrict the degree of confidence one can place on the prediction. We have a high level of confidence in the predictions for the near future.

Southwestern Idaho Supervisory Area

The current standing volume is 62 MMBF higher than the desired standing volume if all stands are regenerated naturally. If some of the medium sites are regenerated by planting and the remaining medium along with the high and low sites left to regenerate naturally, the current standing volume is 68 MMBF above the desired standing volume.

A total of five harvest scheduling scenarios were analyzed.

- Optimize PNV (maximize PNV).
- No planting or precommercial thinning.
- All acres available for planting and precommercial thinning.
- No planting but precommercially thin up to 300 acres per year.
- Plant up to 30 acres per year and precommercially thin up to 300 acres per year.

Their impact on the objective of achieving the desired standing volume is depicted in Figures 2, 3, 4, 5, and 6. The harvest scheduling model maximized the PNV for each of the scenarios.

Figure 2 depicts the optimization harvest scenario. The model opted to harvest most

of the timber in the first decade. This scenario does not allow a sustained even flow of timber over the ten decades. The desired standing volume falls below the Nat-DSV level during the first decade and never regains the volume to obtain the Nat-DSV level.
Figure 3 depicts the no plant or precommercial thin harvest level (9 and 10 MMBF). Both the 9 and 10 MMBF harvest levels maintained a standing volume above the Nat-DSV for the entire ten decades.

Figure 4 depicts all acres available for planting and precommercial thinning for harvest levels of 9, 10, 11, and 12 MMBF. During any harvest alternative, the model could clearcut and plant and/or precommercially thin as many acres as deemed necessary to maximize NPV. All four harvest levels maintained a standing volume above the Nat-DSV level for the entire ten decades.

Figure 5 depicts the planting of up to 30 acres and precommercially thinning of up to 300 acres per year scenario (9, 10, and 11 MMBF). All three harvest levels maintained a standing volume about the Nat-DSV for the entire ten decades.

Figure 6 depicts the no plant but precommercially thinning up to 300 acres per year for harvest levels of 9, 10, and 11 MMBF. As with all the above scenerios, the standing volume at the end of each decade remained above the desired standing volume.

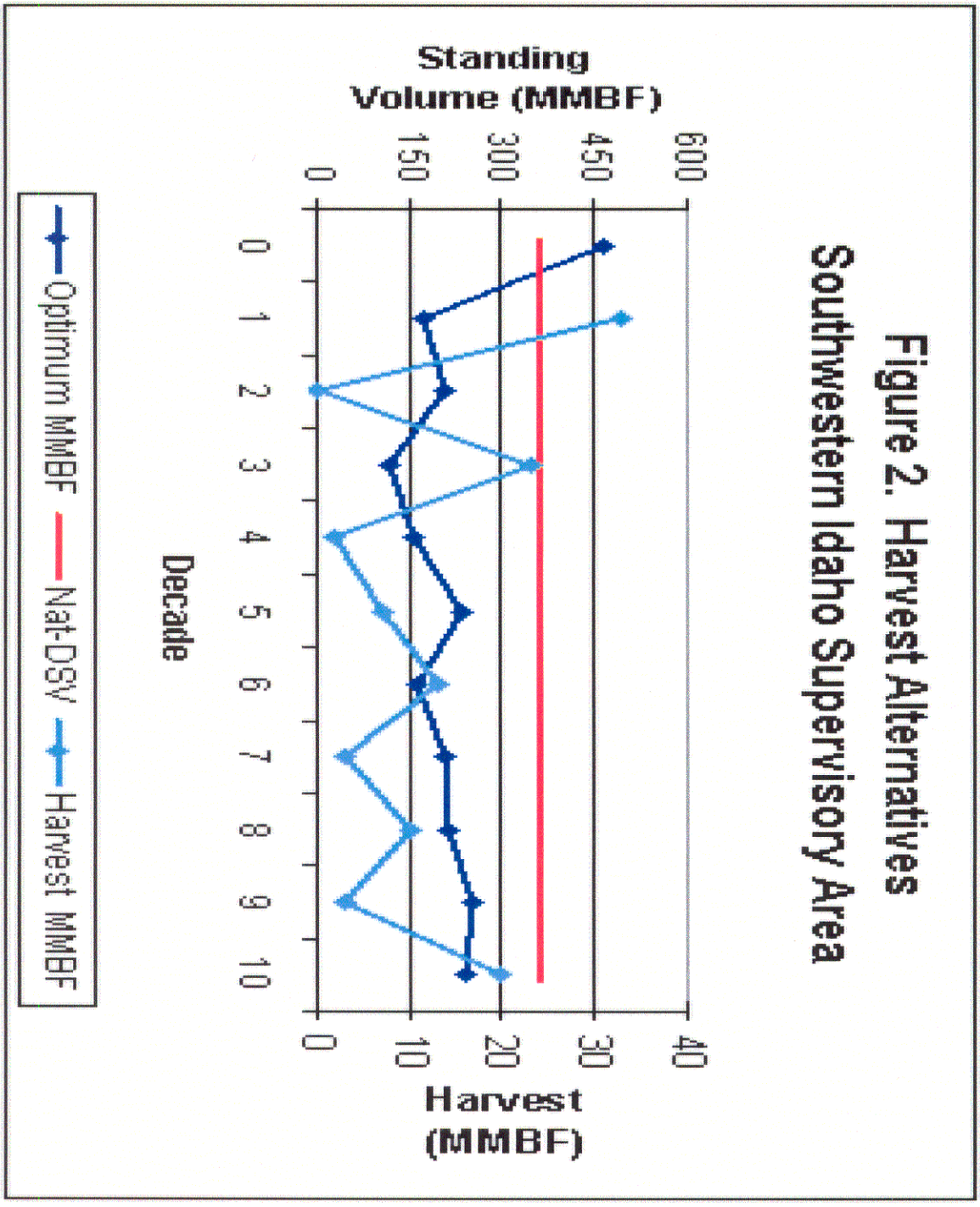
Figure 2. Harvest Alternatives
Southwestern Idaho Supervisory Area
Standing Volume (MMBF)
0
150
300
450
600
Harvest (MMBF)
0
10
20
30
40
Decade
0 1 2 3 4 5 6 7 8 9 10
Optimum MMBF
Nat-DSY
Harvest MMBF

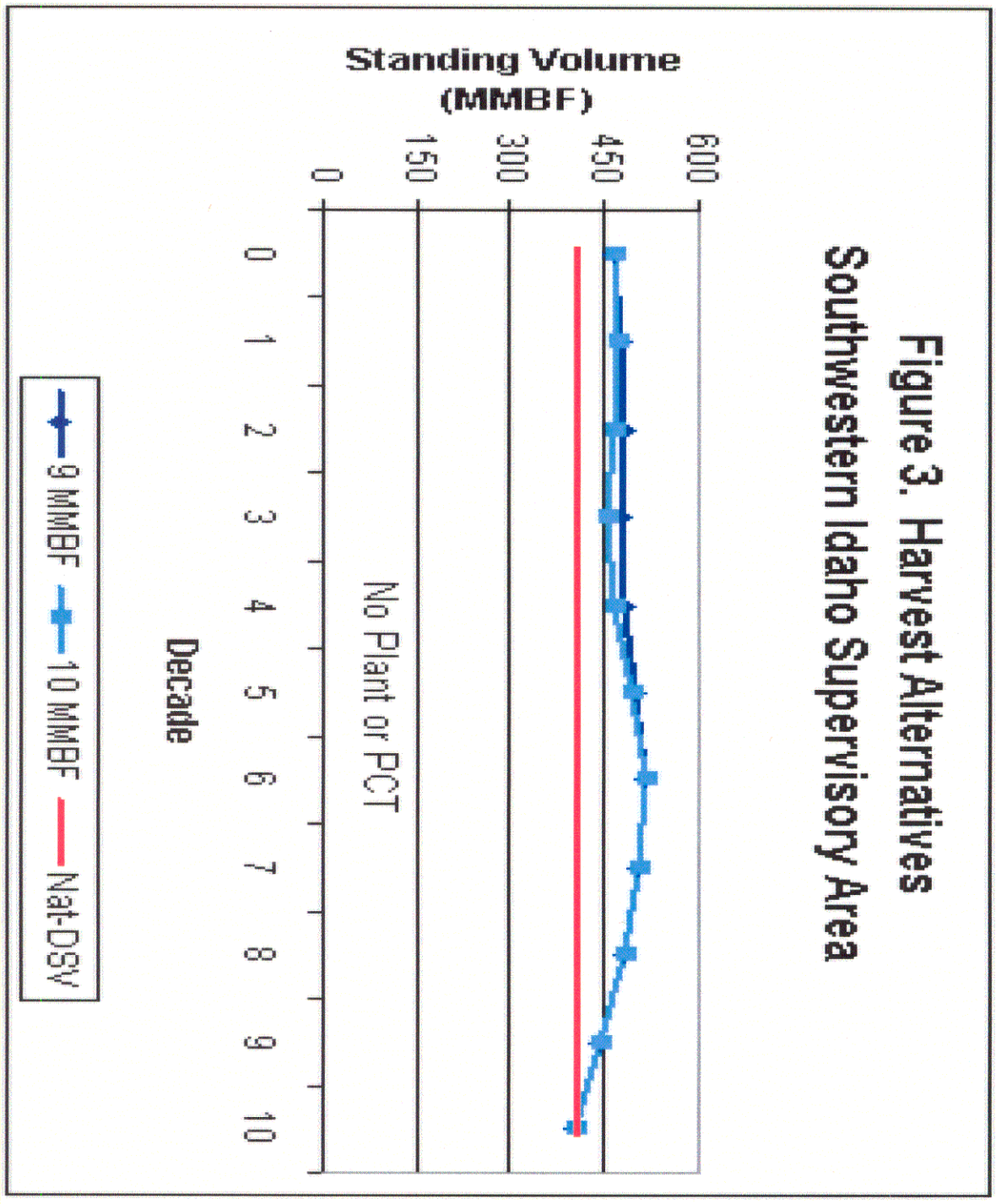
Figure 3. Harvest Alternatives
Southwestern Idaho Supervisory Area
Standing Volume
(MMBF)
600
450
300
150
0
0 1 2 3 4 5 6 7 8 9 10
Decade
No Plant or PCT
9 MMBF
10 MMBF
Nat-DSV

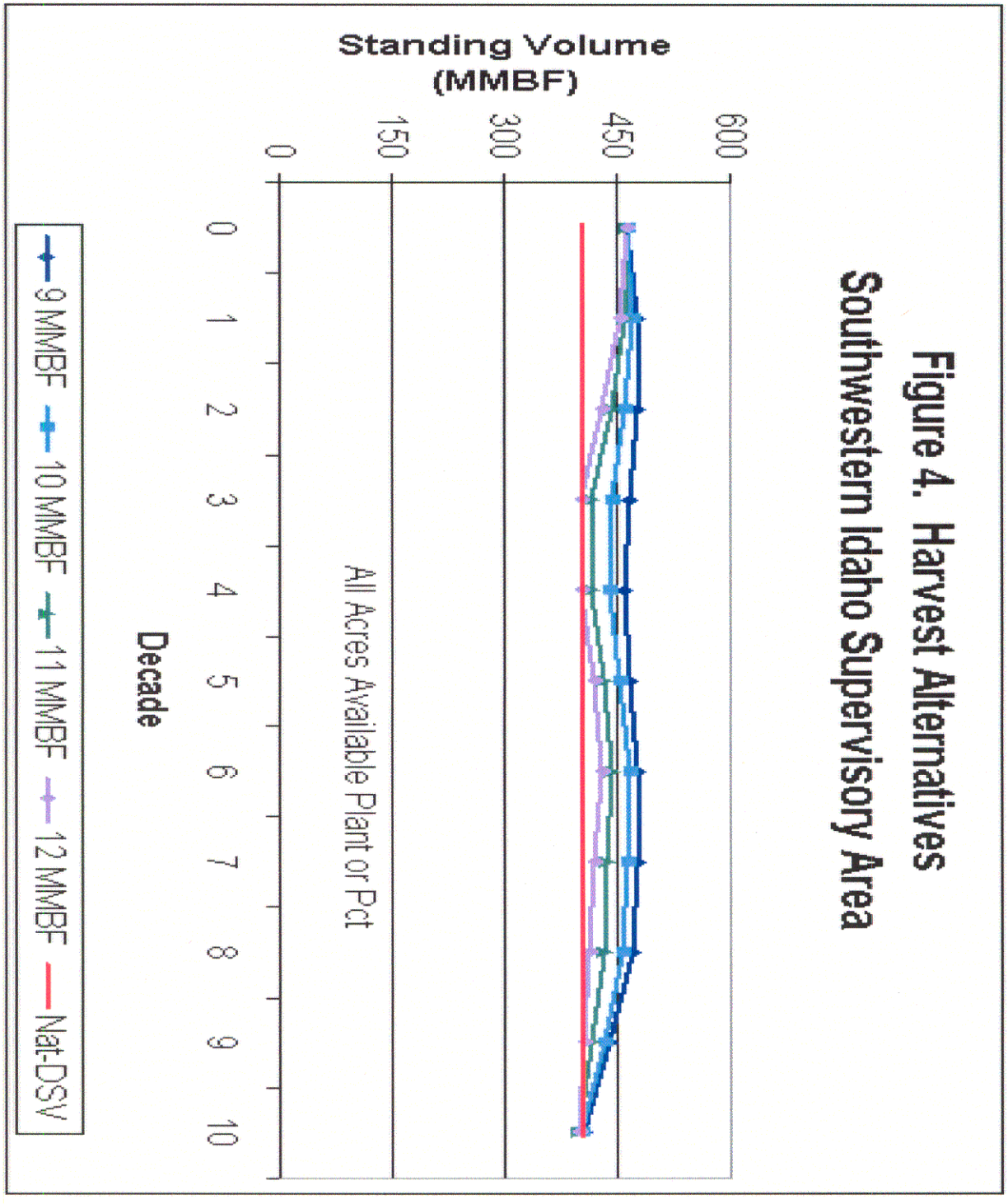
Figure 4. Harvest Alternatives
Southwestern Idaho Supervisory Area
Standing Volume
(MMBF)
600
450
300
150
0
All Acres Available Plant or Pct
0 1 2 3 4 5 6 7 8 9 10
Decade
9 MMBF
10 MMBF
11 MMBF
12 MMBF
Nat-DSV

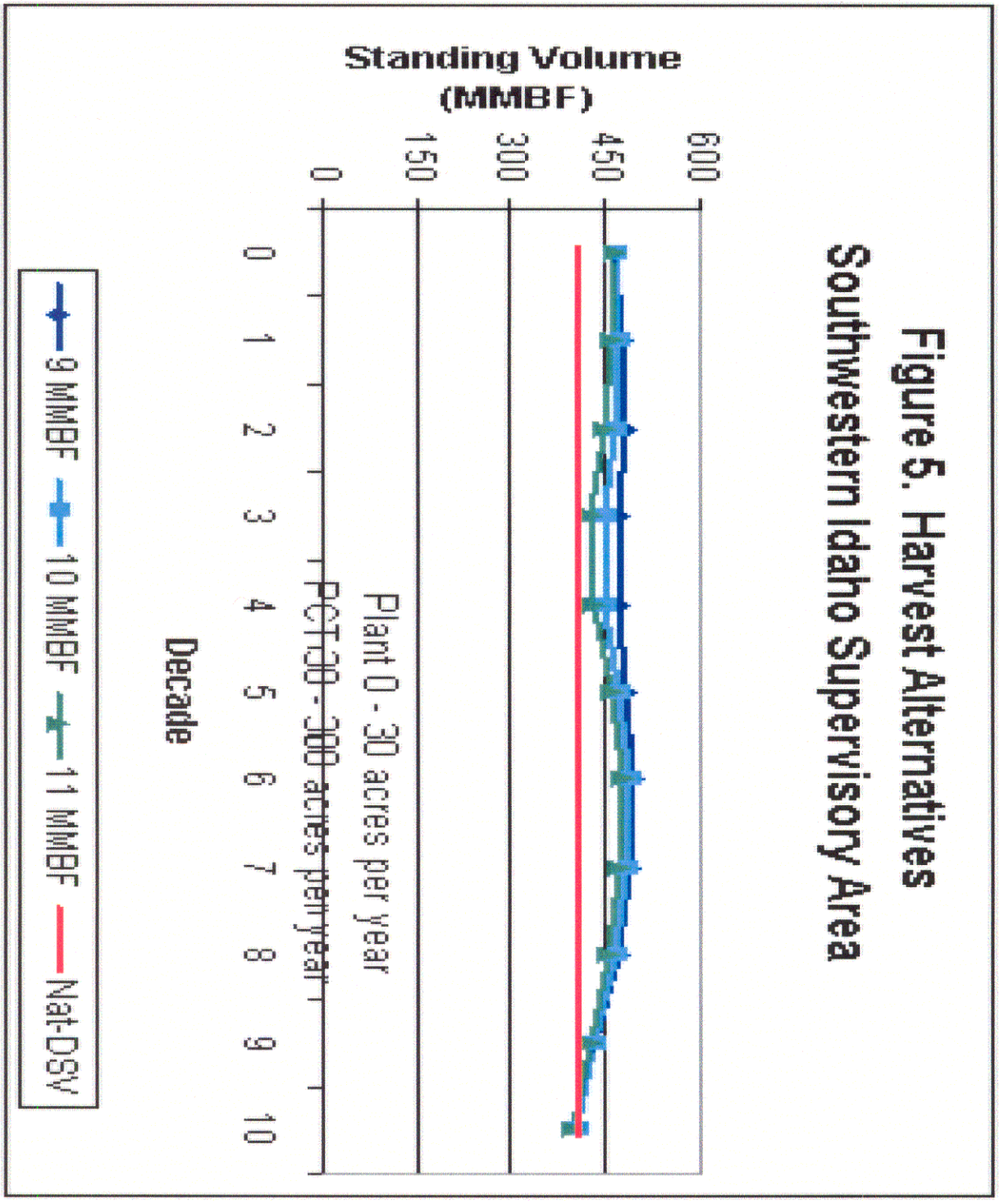
Figure 5. Harvest Alternatives
Southwestern Idaho Supervisory Area
Standing Volume
(MMBF)
600
450
300
150
0
0 1 2 3 4 5 6 7 8 9 10
Decade
Plant 0 - 30 acres per year
Pct 30 - 300 acres per year
9 MMBF
10 MMBF
11 MMBF
Nat-DSV

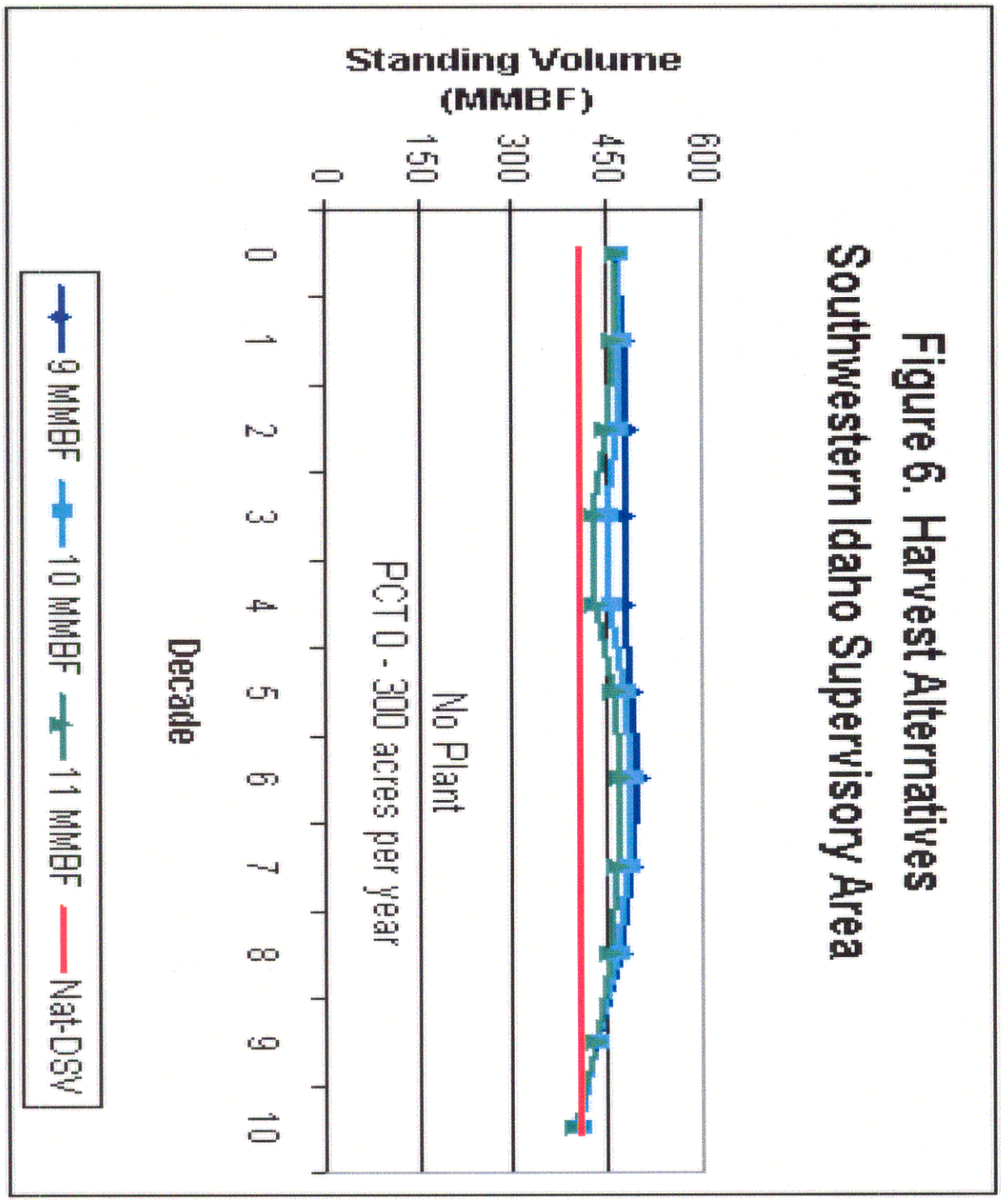
Figure 6. Harvest Alternatives
Southwestern Idaho Supervisory Area
Standing Volume
(MMBF)
600
450
300
150
0
0 1 2 3 4 5 6 7 8 9 10
Decade
No Plant
PCT 0 - 300 acres per year
9 MMBF
10 MMBF
11 MMBF
Nat-DSV

Table 8 shows the PNV of the different harvest levels of the different scenarios. The optimum harvest level has the highest PNV. This scenario involves harvesting most of the timber in the first decade. This option does not provide a sustained even flow of timber to the mills. The sustained even flow annual harvest level alternative with the highest PNV is all acres available for planting or precommercial thinning, with an annual harvest of 12 MMBF. The greater the harvest level the higher the NPV.

Table 8. Present Net Value
Southwestern Idaho Supervisory Area

Harvest Level (MMBF	Plant (Acres)	Pct (Acres)	NPV (Million $)
Optimum	na	na	86.0
12	all avail	all avail	60.1
11	all avail	all avail	56.9
11	<30	<300	56.3
11	0	<300	56.0
10	all avail	all avail	52.2
10	<30	<300	52.1
10	0	<300	52.0
10	0	0	51.8
9	all avail	all avail	47.4
9	<30	<300	47.3
9	0	<300	47.2
9	0	0	47.2

CONCLUSION

The younger stands on the Southwestern Idaho Supervisory Area are healthy, exhibit good growth, and will continue to provide forest products for perpetuity.

The Department of Lands will develop appropriate annual harvest level recommendations based on the results of the analysis in this report, and present it to the Land Board for consideration. In addition, the results in this report will be used to assess the effects on the forest resource of the various harvest levels under consideration by the Board.

The State Board of Land Commissioners will determine the annual harvest level for the Southwestern Idaho Supervisory Area. The selected annual harvest level will ensure that the state's management objectives are achievable in light of current stand conditions and stand structure, current resources, and environmental and social concerns.

Stands on the Southwestern Idaho Supervisory Area will be remeasured and the data reanalyzed on a five year schedule. Recommendations will be modified based on the new data and conditions at that time.

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Appendix A

Abbreviations

ABBREVIATIONS

DBH	Diameter at breast height (4.5 feet on the uphill side of the tree)
MBF	Thousand Board Feet
MMBF	Million Board Feet
USFS	United States Forest Service
USGS	United States Geological Survey

SIZE CLASS SPECIFICATIONS

SAWTIMBER (SAW)	8.0 inches DBH and greater
POLE TIMBER (POLE)	3 inches DBH to 7.9 inches
SAPLINGS	4.5 feet high to 2.9 inches DBH
SEEDLINGS	Established to 4.4 feet high

TREE SPECIES

Douglas-fir	*Pseudotsuga menziesii*
Ponderosa Pine	*Pinus ponderosa*
Western White Pine	*Pinus monticola*
Lodgepole Pine	*Pinus contorta*
Grand Fir	*Abies grandis*
Alpine Fir	*Abies lasiocarpa*
Engelmann Spruce	*Picea engelmannii*
Western Hemlock	*Tsuga heterophylla*
Western Redcedar	*Thuja plicata*
Western Larch	*Larix occidentalis*

Appendix B

Definitions

Cull or Cull Volume	The total amount of wood fiber contained within the gross volume estimate that is deemed unusable or unmerchantable for a product-in this case, lumber. Measured and/or expressed in the same units as gross volume. Often expressed as a percentage (%).
Forestland	Land which has or had at least 10 percent of its area stocked with commercial trees of any size and has not been developed for other uses.
Gross Volume	The total amount of wood fiber capable of occupying a given space. Measured and/or expressed in cubic feet (CU FT) or thousand board feet (MBF).
Gross Volume Change	Annual growth of a tree in the absence of harvesting and mortality. It includes ingrowth and accretion.
Mean Annual Increment	The total increment of a tree or stand up to a given age divided by that age.
Mortality	Amount of sound wood volume dying from natural causes during a specified period.
Net Volume Change	The increase in net volume of a specified size class for a specific year. (Note: Components of net annual growth includes the increment in net volume of trees at the beginning of the specific year surviving to its end, minus net volume of trees that died during the year, minus the volume that became unmerchantable.)
Net Volume	The total amount of wood fiber contained within the gross volume estimate that is deemed usable or merchantable, measured and/or expressed in the same units as gross volume.
NonForestland	Land that has never supported forest growth or has been permanently developed for other uses such as agriculture, utility right-of-way, state highways, or industrial purposes.

Periodic Annual Increment	The growth of a tree or stand observed over a specific time period divided by the length of the period.
Pole Size Stands	Stands where the dominant and codominant trees have an average DBH between 3.0 inches and 7.9 inches.
Pole Trees	Trees 3.0 to 7.9 inches DBH.
Primary Forestland	Forestland which is capable of (1) regenerating naturally within 20 years and (2) providing successive crops of commercial timber within a 120-year period. Typically, primary forestland is capable of producing 100 board feet of timber per acre (approximately 20 cubic feet/acre) per year.
Sapling Stands	Stands where the dominant and codominant trees are taller than 4.5 feet in height and less than 3 inches in DBH.
Sapling Trees	Trees 0.1 inch DBH to 2.9 inches DBH.
Sawtimber Stands	Stands where the dominant and codominant trees have an average DBH greater than 8 inches.
Sawtimber Trees	Trees which are 8.0 inches DBH and larger.
Site Index	A species-specific measure of actual or potential forest productivity expressed in terms of the average height of trees included in a specific stand component at a specific index or base age.
Secondary Forestland	Forestland which is not capable of (1) regenerating naturally within 20 years and (2) providing successive crops of commercial timber within a 120-year period. Typically, secondary forestland is not capable of producing 100 board feet of timber per acre (approximately 20 cubic feet/acre) per year.
Seedling Stands	Stands where the crop trees are less than 4.5 feet tall.
Seedling Trees	Trees less than 0.1 inch DBH.

Appendix C

Timber Type Classifications

A timber type is a discrete, homogeneous unit with characteristics that separate it from the surrounding areas. Differentiation between some forested areas is difficult. Often the gradation from one stand to another is a continuum with no definable line to demarcate the change from one stand category to another. In these cases, the boundaries of the timber types will be more subjective.

The timber typing scheme is a two-digit numbering system where the first number reflects the size class, the second number the stocking density. Size class designation is listed below:

Class		Description
(1)	Large sawtimber	Dominant and codominant trees have an average DBH greater than 16 inches.
(2)	Small sawtimber	Dominant and codominant trees have an average sawtimber DBH between 8 to 16 inches.
(3)	Poles	Dominant and codominant trees have an average DBH between 3 inches and 7.9 inches.
(4)	Saplings	Crop trees taller than 4.5 feet in height but less than 3 inches in DBH.
(5)	Seedlings	Crop trees less than 4.5 feet tall.
(6)	Nonstocked	Areas presently stocked below minimum levels needed to meet FPA requirements.

The stocking density designation is listed below:

Class	Description
(0)	No breakdown in stand density.
(1)	Sawtimber having 20 to 60 square feet of Basal Area; or for saplings and poles, a spacing of 15 feet by 15 feet or greater (200 trees or less per acre).

(2) Sawtimber having 61 to 120 square feet of basal area; saplings having a spacing greater than 7.5 by 7.5 feet but less than 15 by 15 feet between trees (200 to 800 stems per acre); or poles having a spacing greater than 11 x 11 feet but less than 15 x 15 feet between trees (200 to 350 trees per acre).

(3) Sawtimber having greater than 120 square feet of basal area; saplings having a spacing less than 7.5 by 7.5 feet (800 plus stems per acre); or poles a spacing less than 11 x 11 between trees (350 plus trees per acre).

Combining these two numbers gives the timber types. Listed below are the timber type designations based on the above criteria. The first number of the type refers to the size class and the second number to stand density.

Timber type	Description
11	Large sawtimber, stocking class 1
12	Large sawtimber, stocking class 2
13	Large sawtimber, stocking class 3
21	Small sawtimber, stocking class 1
22	Small sawtimber, stocking class 2
23	Small sawtimber, stocking class 3
31	Poles, stocking class 1
32	Poles, stocking class 2
33	Poles, stocking class 3
41	Saplings, stocking class 1
42	Saplings, stocking class 2
43	Saplings, stocking class 3
50	Seedlings, stocking level must meet FPA guidelines of 150 seedlings on ponderosa pine sites or 200 seedlings on mixed species sites.
60	Non-stocked
90	Non-forestland

Appendix D

Timber Type Descriptions

A description of each timber type is given below. The descriptions are based on ground truthing and plot data.

CODE: 11

NAME: Large sawtimber, stocking class 1.

TYPING CRITERIA: Dominant and codominant trees average 16.0 inches DBH or greater. Sawtimber averages 20 to 60 square feet of basal area.

DESCRIPTION: Net volume averages 6,342 board feet per acre. Defect averages approximately 10 percent. Most of these stands are the result of a seed tree harvesting regime.

Timber Type 11

Large sawtimber, (stocking class 1),

CODE: 12

NAME: Large sawtimber, stocking class 2.

TYPING CRITERIA: Dominant and codominant trees average 16.0 inches DBH or greater. Sawtimber averages 61 to 120 square feet of basal area.

DESCRIPTION: Net volume averages 13,776 board feet per acre. Defect averages approximately 11 percent. These stands resulted from shelterwood cuts or are natural stands.

Timber Type 12/43

Large sawtimber, stocking class 2
over a sapling understory (stocking class 3)

CODE: 13

NAME: Large sawtimber, stocking class 3.

TYPING CRITERIA: Dominant and codominant trees average 16.0 inches DBH or greater. Sawtimber averages 61 to 120 square feet of basal area.

DESCRIPTION: Net volume averages 23,417 board feet per acre. Defect averages approximately 9 percent.

Timber Type 13

Large sawtimber, stocking class 3

CODE: 21

NAME: Small sawtimber, stocking class 1.

TYPING CRITERIA: Dominant and codominant trees between 8.0 inches and 16.0 inches DBH. Sawtimber averages 20 to 60 square feet of basal area.

DESCRIPTION: Net volume averages 3,906 board feet per acre. Defect averages approximately 6 percent.

Timber Type 21
Small sawtimber, (stocking class 1)

CODE: 22

NAME: Small sawtimber, stocking class 2

TYPING CRITERIA: Dominant and codominant trees between 8.0 inches and 16.0 inches DBH. Sawtimber averages 61 to 120 square feet of basal area.

DESCRIPTION: Net volume averages 8,679 board feet per acre. Defect averages approximately 7 percent.

Timber Type 22
Small sawtimber, stocking class 2

CODE: 23

NAME: Small sawtimber, stocking class 3

TYPING CRITERIA: Dominant and codominant trees between 8.0 inches and 16.0 inches DBH. Sawtimber averaging greater than 120 square feet of basal area.

DESCRIPTION: Net volume averages 13,197 board feet per acre. Defect averages approximately 10 percent.

Timber Type 23

Small sawtimber stocking class 3

CODE: 31

NAME: Pole, stocking class 1.

TYPING CRITERIA: Dominant and codominant trees between 3.0 to 7.9 inches DBH.

DESCRIPTION: The average age of these plots is 20 years. These stands did contain some sawtimber but the majority of the stand is in the pole size class.

Timber Type 31
Pole Size, Stocking Class 1

CODE: 32

NAME: Pole, stocking class 2.

TYPING CRITERIA: Dominant and codominant trees between 3.0 to 7.9 inches DBH.

DESCRIPTION: The average age of these plots is 25 years. These stands did contain some sawtimber but the majority of the stand is in the pole size class.

Timber Type 32

Pole size, stocking class 2
Precommercial thin

CODE: 33

NAME: Pole, stocking class 3.

TYPING CRITERIA: Dominant and codominant trees between 3.0 to 7.9 inches DBH.

DESCRIPTION: The average age of these plots is between 20 to 30 years. These stands did contain some sawtimber but the majority of the stand is in the pole size class.

Timber Type 33

Pole size, stocking class 3

CODE: 41

NAME: Sapling, stocking class 1.

TYPING CRITERIA: Dominant and codominant trees less than 3.0 inches DBH and a height greater than 4.5 feet.

DESCRIPTION: This type had a light, established stand of saplings with a light stocking of seedlings, and an overall age of 20 to 30 years and an average height of 20 feet.

Timber Type 41

Sapling size, stocking class 1

CODE: 42

NAME: Sapling, stocking class 2.

TYPING CRITERIA: Dominant and codominant trees less than 3.0 inches DBH and a height greater than 4.5 feet.

DESCRIPTION: This stand had an overall average age of approximately 10 years and an average height of 10 feet.

Timber Type 42

Sapling size, stocking class 2

CODE: 43

NAME: Sapling, stocking class 3.

TYPING CRITERIA: Dominant and codominant trees less than 3.0 inches DBH and a height greater than 4.5 feet.

DESCRIPTION: This stand had an overall average age of 10 to 15 years and an average height of 13 feet.

Timber Type 43

Sapling size, stocking class 3

CODE: 50

NAME: Seedlings

TYPING CRITERIA: Dominant and codominant trees under 4.5 feet in height.

DESCRIPTION: Stands that are considered stocked with commercial species at a minimum of 200 trees per acre.

Timber Type 50

Seedling size

CODE: 60

NAME: Nonstocked

TYPING CRITERIA: Verified nonstocked from ground observation.

DESCRIPTION: Areas that are not considered stocked with commercial species at a minimum of 200 trees per acre. These are generally areas which are nonstocked because harvesting operations have concluded and site preparations and/or planting operations are not finished or areas where natural events (fire, windthrow, insects, and disease) have created openings which have not been planted.

Timber Type 60

Non-stocked

Appendix E

Management Base

The supervisory area is responsible for allocating the Land Management Base which is grouped into three categories (primary, secondary, and nonforest) based on vegetative cover and best use.

The Land Management Base is defined as follows:

010 - Primary forestland

Forestland which is capable of (1) regenerating naturally within 20 years and (2) providing successive crops of commercial timber within a 120-year period. Typically, primary forestland is capable of producing 100 board feet of timber per acre (approximately 20 cubic feet/acre) per year.

The primary forestland base will be used to compile the annual harvest calculations.

020 - Secondary forestland

Forestland which is not capable of (1) regenerating naturally within 20 years and (2) providing successive crops of commercial timber within a 120-year period. Typically, secondary forestland is not capable of producing 100 board feet of timber per acre (approximately 20 cubic feet/acre) per year.

The secondary forestland base will have harvest activities but will not be included in the annual harvest calculations.

Also included in secondary forestland is forestland that would be classed as primary forestland but is currently withdrawn from timber harvest calculations due to:

1. Special considerations. Two examples would be land in a land exchange package where management activity would be precluded (logging activity will change the land values), or special areas set aside like the Land Board Cedar Grove, St. Joe Supervisory Area or the Upper Priest Lake Scenic Area, Priest Lake Supervisory Area.

2. Land not feasible to log at the present time because of accessibility or adverse logging conditions. Two examples are (1) parcels of land surrounded by private or federal ownership where the State cannot obtain a right-of-way access, or (2) land with geologically unstable soil where harvesting will destabilize the slopes.

030 - Nonforestland

Land that has never supported forest growth or has been permanently developed for other uses such as agriculture, utility right-of-way, state highways, or industrial purposes.

Appendix F

Southwestern Idaho Supervisory Area Summary

Table F-1. Acres by Timber Type
Southwestern Idaho Supervisory Area

Timber Type	Acres
Primary Timber Type	
11	4,840
12	5,772
13	3,588
21	15,337
22	16,646
23	4,858
Total Sawtimber	51,041
31	332
32	1,818
33	258
41	343
42	820
43	836
50	1,643
60	1,525
Total Non-Sawtimber	7,575
Total Primary Base	58,616
Secondary Timber Type	13,110
Non-forest	429,436
Total Acreage	501,162

Table F-2. Annual Net Volume Change Per Acre Southwestern Idaho Supervisory Area (Board Feet)

Timber Type	Annual Net Volume Change (BD FT)	Acres	Total Annual Net Change (BD FT)
11	242	4,840	1,172,828
12	175	5,772	1,011,544
13	241	3,588	862,928
21	112	15,337	1,713,949
22	209	16,646	3,481,276
23	276	4,858	1,342,111
31	31	10,330	10,330
42	0	820	-
43	0	836	-
50	-24	(39,556)	(39,556)
60	132	200,648	200,648
Total			9,756,058

Table F-3 Yield Table High Sites
Southwestern Idaho Supervisory Area
Natural Regeneration with PCT and 1 CT

Stand Age	Net Volume (BD FT)	Periodic Annual Increment (BD FT)	Mean Annual Increment (BD FT)
23	-	0	0
28	400	80	14.3
33	1,500	220	45.5
38	3,900	480	102.6
43	7,700	760	179.1
48	12,200	900	254.2
53	16,900	940	318.9
58	14,100	520	336.2
63	17,200	620	358.7
68	20,200	600	376.5
73	23,200	600	391.8
78	25,800	520	400.0
83	28,900	620	413.3
88	31,000	420	413.6
93	33,800	560	421.5
98	36,400	520	426.5

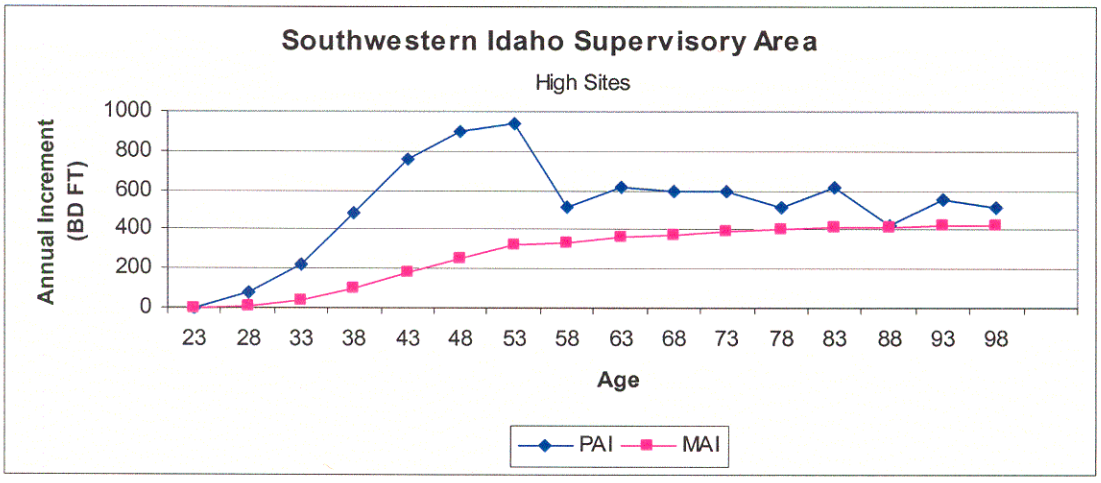

Table F-4 Yield Table Medium Sites
Southwestern Idaho Supervisory Area
Natural Regeneration with PCT and 1 CT

Stand Age	Net Volume (BD FT)	Periodic Annual Increment (BD FT)	Mean Annual Increment (BD FT)
23	-	0	0
28	-	0	0.0
33	100	20	3.0
38	900	160	23.7
43	3,200	460	74.4
48	6,100	580	127.1
53	9,200	620	173.6
58	11,900	540	205.2
63	9,300	340	220.6
68	11,100	360	230.9
73	12,700	320	237.0
78	14,100	280	239.7
83	15,800	340	245.8
88	16,900	220	244.3
93	18,400	300	247.3
98	19,700	260	248.0

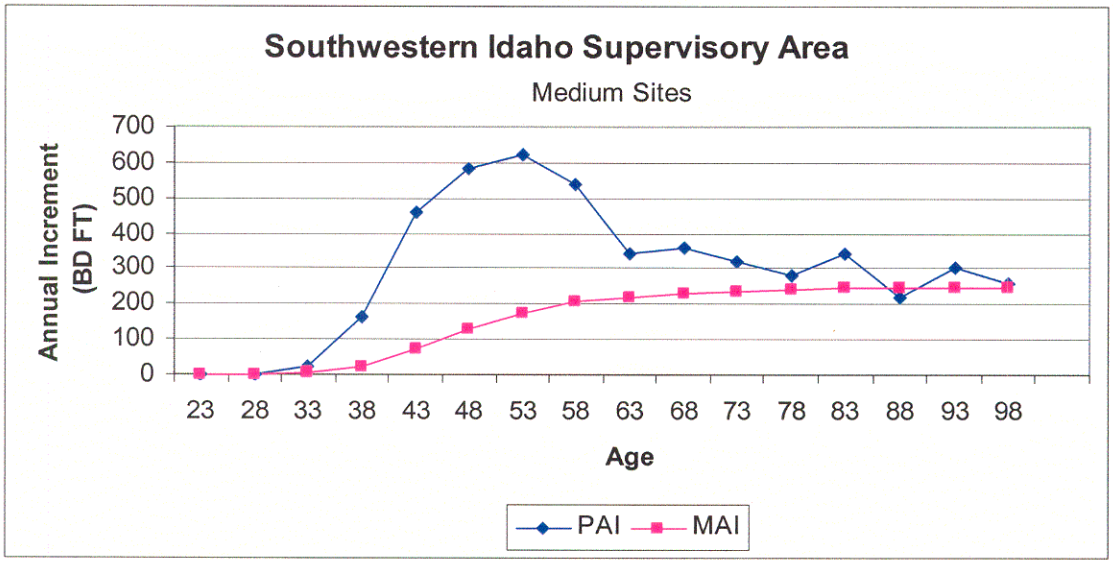

Table F-5 Yield Table Medium Sites
Southwestern Idaho Supervisory Area
Natural Regeneration with PCT

Stand Age	Net Volume (BD FT)	Periodic Annual Increment (BD FT)	Mean Annual Increment (BD FT)
38	-	0	0.0
43	-	0	0.0
48	200	40	4.2
53	700	100	13.2
58	1,500	160	25.9
63	2,300	160	36.5
68	3,600	260	52.9
73	5,000	280	68.5
78	6,400	280	82.1
83	7,900	300	95.2
88	9,100	240	103.4
93	10,200	220	109.7
98	11,400	240	116.3
103	12,400	200	120.4
108	13,200	160	122.2
113	13,900	140	123.0
118	14,500	120	122.9

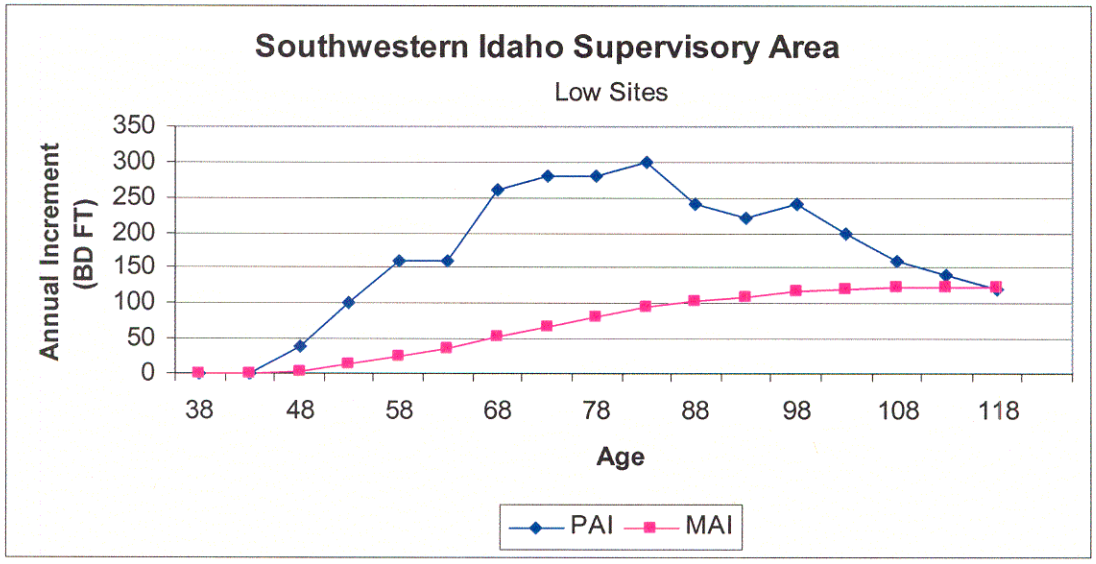

Table F-6 Yield Table Medium Sites
Southwestern Idaho Supervisory Area
Planted with PCT

Stand Age	Net Volume (BD FT)	Periodic Annual Increment (BD FT)	Mean Annual Increment (BD FT)
22	-	0	0
27	100	20	3.7
32	800	140	25.0
37	2,200	280	59.5
42	4,700	500	111.9
47	8,000	660	170.2
52	11,200	640	215.4
57	14,100	580	247.4
62	17,000	580	274.2
67	19,500	500	291.0
72	21,500	400	298.6
77	22,900	280	297.4
82	24,800	380	302.4
87	25,900	220	297.7
92	27,400	300	297.8
97	28,700	260	295.9

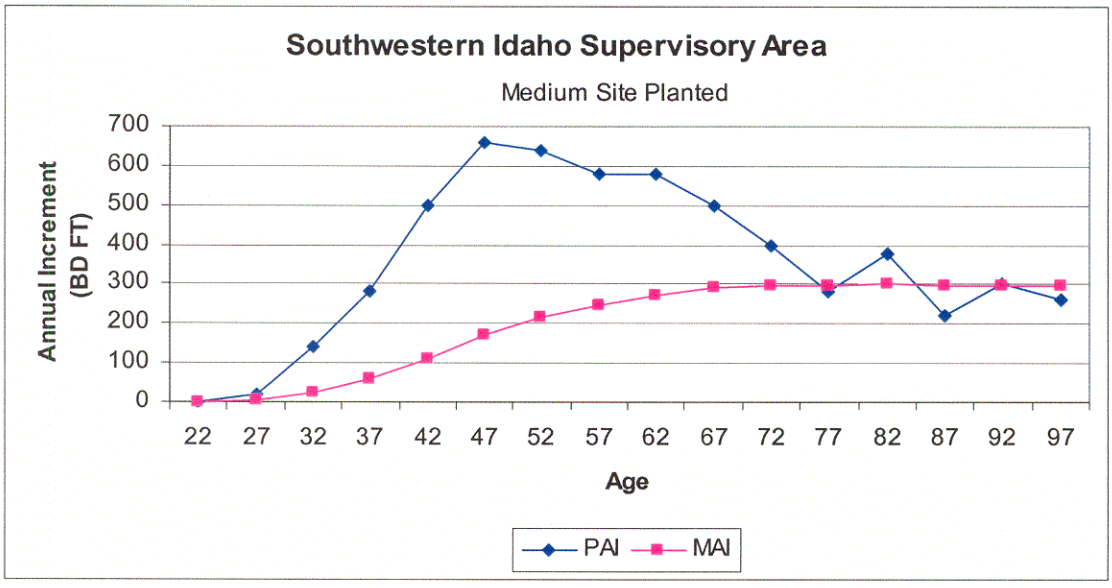

Table F-7. IDL_Planner and SpecWin Assumptions
Southwestern Idaho Supervisory Area

Site	Site Index	Regeneration	Age of Precomm Thin	Age of Comm Thin	Final Harvest	Percent Volume Removal Initial Harvest	# of Years before Final Harvest following Shelterwood Cut
High	80+	Natural	20	50-55	Shelterwood	60	10
Medium	60-79	Planted	20	50-55	Clearcut	100	NA
Medium	60-79	Natural	25	55-60	Shelterwood	60	15
Low	<60	Natural	30	NA	Shelterwood	60	20

Species	10 Year Average Stumpage
DF&WL	186.25
ES	245.76
GF,WH&SAF	219.76
LP	250.45
PP	231.89
WC	NA
WP	NA

Site Class	Acres
High	604
Medium	25,789
Low	32,223

Riperian Buffers	
Site	Acres
High	26
Medium	1,128
Low	1,410